SUMMARY: Errors and Application of the 1998 Landsat Classified Image

Error matrix for the 1998 classification:

		OBSERVED (from orthophotos)								Consumer's accuracy:
		forested urban	grassy urban	paved urban	grass/ shrub/ crops	water	bare soil	forested	**Row Total**	
EXPECTED (i.e. pixels as classified)	forested urban	27	5	4	9	0	0	5	**50**	54%
	grassy urban	0	9	35	6	0	0	0	**50**	18%
	paved urban	0	0	47	1	0	0	2	**50**	94%
	grass/shrub/ crops	0	0	0	49	0	0	1	**50**	98%
	water	0	0	0	0	50	0	0	**50**	100%
	bare soil	0	1	7	3	0	39	0	**50**	78%
	forested	0	0	0	1	0	0	49	**50**	98%
	Column Total	**27**	**15**	**93**	**69**	**50**	**39**	**57**	**350**	

Producer's accuracy: 100% 60% 51% 71% 100% 100% 86%

77% = overall accuracy rate

Percent (total) impervious-area percentages:

| Categories from the classified Landsat image:	Observed impervious-area percentages:	
	1991	**1998**
"UNDEVELOPED"		
Open water	0	0
Coniferous vegetation	1	—
Deciduous vegetation	4	—
Forested	—	3
"DEVELOPED"		
Grassy/shrubby vegetation	29	5
Bare earth	—	98
Forested urban	23	38
Grassy urban	31	74
Intense urban	62	92

Limiting the contribution of any one class to an error of ± 1 percent requires:

$$T^2/N_i \geq [2(s_i + s_i/\sqrt{n})]^2$$

where T is the total number of pixels in the classified area of interest,
N_l is the number of pixels of class "i" within the area of interest;
s_l is the standard deviation of class-i pixels for the observed land-cover type of interest, and
n is the number of pixels of class i that were counted in the original accuracy assessment.

This relationship is shown graphically below for the values of s_i determined for the observed land-cover type, "impervious area." As a general rule, low-development watersheds of just a few hundred acres should have estimates of total imperviousness within a few percent; more urban areas will require areas of one-half to one square mile for equally reliable results. The most urban areas should be evaluated over areas of one to two square miles (or more).
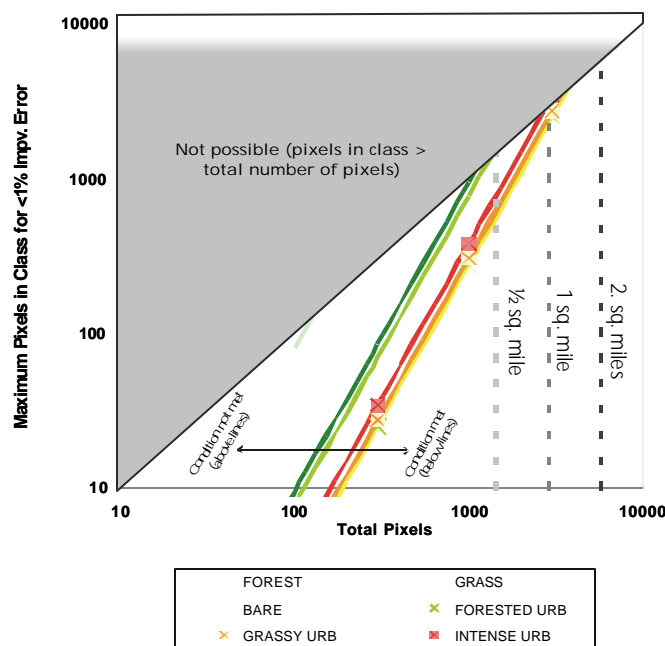
Graph showing the minimum number of pixels (and corresponding land area) required to limit errors in total impervious-area percentages to one percentage point in each of the seven land-cover classes. This condition is met below and to the right of each of the lines, which needs to be evaluated for each class individually.